MOUNTAIN PINE BEETLE CONTROL PROJECT - 1956

DELL CREEK

TETON NATIONAL FOREST - WYOMING

TECHNICAL GUIDELINES

By

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The infestation of mountain pine beetle (Dendroctonus monticolae Hopk.) on the upper Hoback river in Dell Creek was discovered and surveyed during the fall months of 1955. This area contains a concentration of heavily infested lodgepole pine trees that represents a threat to the extensive stands of lodgepole pine adjoining the infested area. In order to reduce this threat a control project is to be conducted during the spring and summer months of 1956. The method employed will be the treatment of currently infested trees by the application of toxic chemicals.

TRAINING

To start the project off on the right foot a training session should be conducted at the beginning of the project to acquaint the project personnel with the over-all purpose and objective as well as their own duties and responsibilities. It is suggested that this training session be designed and conducted jointly by the Teton National Forest and the Division of Forest Insect Research. It will, of course, be the responsibility of the Division of Forest Insect Research to supply the leadership in the training of proper techniques and methods for spotting and treating infested trees. The entomologist should also review the background and biological information that supports the entomological justification of the project.

METHODS AND PROCEDURES

Treatment of the infested trees can start any time after the area opens up, but should be completed by June 30. The exact boundaries of the infestation will be marked on the ground by a representative of the Division of Forest Insect Research. A string layer will subdivide the control area into small parallel sections marked by lines

of string. The parallel string lines should be run in an east-west direction and approximately 4 chains apart. Within the string lines combination spotting-treating crews will locate and treat all currently infested trees. It is suggested that the spotting-treating crews be made up of 4 men each (1 crew leader, 3 crew men). The crew size may be altered if a more efficient size is determined for this particular situation. Each crew should be supplied with the following equipment: 4 hand axes and sheaths, 2 sprayrods and nozzles, 2 stirrup pumps and hoses, supply of insecticide in Jeep cans, power saw and accessories, felling axe, wedge and hammer. The insecticide and equipment can be transported by pack animals or four-wheel drive vehicles whichever fits the need. The crews will treat all the trees as they locate them. The treatment of the trees will be accomplished by the application of an ethylene dibromide emulsion using the standard stirrup pump, hose, rod, and nozzles. The insecticide should be applied in sufficient quantities to cause it to flow or run down the tree. All trees that cannot be sprayed effectively to a 4-inch top diameter should be sprayed standing, felled, and then the unsprayed portion treated.

In addition to their other responsibilities, the project leader and a representative of the Division of Forest Insect Research should act as inspectors and checkers to insure an efficient and effective program.

MANPOWER REQUIREMENTS

Based on an assumption that each crew can locate and treat approximately 20 trees per working day, approximately 150 crew-days will be required to treat the 2,760±635 infested trees. If the duration of the treating project is about 40 working days (May 7 to June 30) 4 spotting-treating crews will be required. Also, one insecticide mixer, one string layer, and transportation personnel plus the required overhead will be needed for the duration of the project.

EQUIPMENT AND SUPPLIES

Axes, hand (Tomahawk) with sheaths		24
Pumps, stirrup, giant "Smith bucket" (without hose or nozzle)		10
Hose, 3/8", 2 braid neophrene		300 ft.
Fins, nozzle, Colo. fan spray type		24
Nozzles, No. 6, solid stream		24
Rods, spray, telescopic type		10
Rods, spray, 4 ft. curved		10
Connectors, "Quick On" Truflate		
#101 female coupling 1/4"		20
#112 male end 1/4"		24
#312 male hose stems, 3/8" with pipe thread 1/4"		10
Wrenches, crescent, 6"		10
Graphite, string pump packing	(about)	100 ft.
Cans, Jeep (screw caps)		200
* Saddles, pack		
Pads, protective insecticide - 1 for each packhorse		
Can, oil measuring, (1 gal. cap.)		1
Rags, Clean		2 bundles
String, butcher, about 3 miles to ball		35 balls
Insecticidal components:		
Ethylene dibromide, tech. grade (99.0%)		10,000 lbs.
Fuel oil No. 1 or No. 2	(approx.)	3,000 gals.
Emulsifier:		
Triton X100 or equal		850 lbs.
Triton B1956 or equal		850 lbs.

These quantities will make sufficient material to spray approximately 3,000 trees at a rate of 5 gallons per tree plus a safety margin equal to about 1,665 gallons of finished emulsion.

II Mixing and Application of Insecticide

The standard 380 mixture should be used. The formula is as follows:

Stock solution (EDB emulsifiable concentrate)	
EDB (ethylene dibromide) tech. grade	3. lbs.
Emulsifier	
Triton X100	.25 "
Triton B1956	.25 "
Fuel oil to make	1 gal.

To make finished emulsion disperse 1 volume of stock solution into 4 volumes of water.

A workable formula for field use is:

EDB (90 lbs.)	1 Jeep can	(5 gals.)
Triton X100 (7.5 lbs.)	about	1 gal.
Triton B1956 (7.5 lbs.)	about	1 gal.
(a suitable volume measure can be made from a one-gallon oil measure).		
Fuel oil		23 gals.

It is suggested that the mixing be done in 50 gallon drums that have had the bottoms removed. A suitable elbow of pipe and spigot should be threaded into the 3/4" spigot opening. The drums should be placed open side up on planks to protect the spigot. A mark is made on the inside of the drum at the 30-gallon level.

To mix field formula concentrate add roughly 1/2 of the fuel oil, pour in EDB and emulsifiers, fill to 30 gal. level with fuel oil. Stir the solution with a shovel and drain off in 1 gallon lots. Pour 1 gallon of the concentrate into each Jeep can. The 4 gallons of water should be added to each Jeep can shortly before the spray is to be applied. The mixture should be shaken to insure the formation of a good emulsion. The resultant emulsion should have a rich milky white creamy appearance. Finished emulsion should be used within a 48-hour period after addition of the water.

The finished emulsion should be applied to the infested boles in sufficient quantities to cause the emulsion to run. Care should be exercised to make certain that the under sides and hard to get at places of the down trees are thoroughly wetted.

Typical mixing station used to formulate ethylene dibromide water in oil emulsion stock solution.

a. Mixing drums (open end)
b. Drums, Tech. grade EDB
c. Drums, emulsifier (one Triton X100, one Triton B1956)
d. Fuel Oil
e. Jeep cans, empty
f. Jeep cans containing one gal. of stock

Hazards Involved in The Use of Ethylene Dibromide

Ethylene dibromide in the concentrated form is extremely harmful to warm blooded animals. Men can be seriously affected by inhalation of the vapors, and their bodily contact with the liquid. Reasonable care will avoid these dangers.

In order to reduce the hazards to a minimum, a carefully chosen man, and trained assistants if necessary, who fully understands the hazards should be selected to mix or otherwise handle the EDB concentrate.

No one else should be allowed to come in contact with the tech. grade EDB or with the stock concentrate.

All mixing should be done outside.

A supply of rags and clean water should be on hand at mixing stations at all times.

No protective clothes are required.

Mixer must wash off spillage with clean water.

Any clothing that becomes contaminated should be removed and washed or aired.

Properly handled EDB is not dangerous but improperly handled it produces serious burns, sickness and even death.

The finished EDB emulsion as applied to the trees is relatively harmless. However, if confined for extended periods in the clothing it will cause some burning and irritation. To protect the treater:

A supply of clean rags and water should be carried by each crew.

Treaters should be instructed to avoid repeated exposure to spray drift and leakage.

All emulsions that reach the skin should be washed off immediately.

Treaters should have their clothing washed at least once a week--if an unusual amount is spilled on the clothing they should be removed immediately and washed.

IN GENERAL, WHENEVER HANDLING TOXIC CHEMICALS, IT IS GOOD BUSINESS TO BE OVERLY CAUTIOUS RATHER THAN TAKE A CHANGE.

HAZARD TO MEN ENGAGED IN SPRAYING SPRUCE TREES WITH AN ETHYLENE DIBROMIDE EMULSION

CONCLUSIONS

1. The concentrations of Ethylene Dibromide found in the air were below 25 ppm. which is probably a satisfactory control figure for repeated eight-hour exposures.

2. Results of animal experiments indicate that vapor concentrations of a few hundred ppm of Ethylene Dibromide can cause systemic effects on single short exposures. If single exposures for less than 7 hours are kept below 100 ppm. no significant exposire is likely to result.

3. Skin contacts of more than a very few minutes duration with the emulsifiable concentrate are expected to result in local burns. Systemic effects may also occur if such contacts are at all extensive and prolonged.

4. If the 380 emulsion is held in contact with the skin, significant irritation (possible burns) are to be expected. There is also a possibility of significant skin absorption from continued contact with clothing which has become soaked with spray.

5. If all other skin surfaces are protected, there is little likelihood of skin irritation or absorption due to occasional exposure of the face to spray drift.

DISCUSSION

Air samples were taken while applying the 280 mixture (2 lb. EDB/5 gal.) 380 mixture (3 lb. EDB/5 gal.) and an oil solution containing 1-1/2 lb. EDB/5 gal. There seems to be no noticeable difference in exposure of operators while handling the various mixtures. There was no significant variation between results obtained by using an obsorber and those obtained by means of an impinger. This indicates that the inhalation hazard is likely to be due to vapor rather than small drops. These samples were taken during quite cold weather and it is likely that somewhat greater values would be obtained at higher temperatures. The concentrations shown in the table may be compared with 25 ppm which is thought to be a satisfactory control figure for repeated eight-hour exposures. It should be remembered that exposure to a few hundred ppm of Ethylene Dibromide for single exposures of one hour or more are likely to result in adverse effects. No significant exposure is likely if single exposures are kept below 100 ppm.

A sample of the concentrate, when applied to the skin of rabbits resulted in burns and death of the animals within 24 hours. The 380 mixture, when bandaged onto the rabbit's skin, caused severe irritation.

The same mixture, when applied to the uncovered ear, was slightly irritating. These results would indicate that the emulsifiable concentrate must be kept off the skin by the use of suitable protective equipment. In the event of accidental contact, the concentrate must be washed off immediately. Ordinary clothing, which covers the skin except for the face, is evidently adequate protection during the spraying operation, provided the clothing is not allowed to wet through. Oil soaked clothing should, of course, not be worn. It appeared that gloves and caps are most likely to become soaked during the spraying operation.

CONCENTRATIONS OF ETHYLENE DIBROMIDE FOUND IN AIR WHILE SPRAYING TREES WITH ETHYLENE DIBROMIDE MIXTURE

Sample	Description	Concentration parts per million
929 and 127	General atmosphere immediately following spraying. Trees in the area being sprayed nearby. Some odor of EDB and oil detectable	3.5; 8.2
143 and 214	Same area as No. 929 sample taken 24 hours later and after a heavy rain. No odor	2.9; nil.
103	Breathing zone of operator while spraying 280 mixture	17
171; 63 54; 149; 53; 57	Breathing zone while spraying with 380 mixture	8.2; 14; 11.4; 15; 9.5; 7.1
58 50	Breathing zone while applying oil solution	5.5; 7.9

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